

Acid conc.

=C5/1000

Acid vol., mL

=C7

Base concentration

=C9/1000

Acid concentration



Acid vol. (0-100 mL)



Base concentration



Ka of acid



**Use the sliders to adjust the variables.**

Sheet1

pH	[H+]	Vb
=Start_pH	=10^(-A42)	=(-Va)*((B42^3+Ka*B42^2-(Kw+Ka*Ca)*B42-Kw*Ka)/(B42^3+(Ka+Cb)*B42^2+(Ka*Cb-Kw)*B42-Ka*Kw))
=A42+(End_pH-Start_pH)/40	=10^(-A43)	=(-Va)*((B43^3+Ka*B43^2-(Kw+Ka*Ca)*B43-Kw*Ka)/(B43^3+(Ka+Cb)*B43^2+(Ka*Cb-Kw)*B43-Ka*Kw))
=A43+(End_pH-Start_pH)/40	=10^(-A44)	=(-Va)*((B44^3+Ka*B44^2-(Kw+Ka*Ca)*B44-Kw*Ka)/(B44^3+(Ka+Cb)*B44^2+(Ka*Cb-Kw)*B44-Ka*Kw))
=A44+(End_pH-Start_pH)/40	=10^(-A45)	=(-Va)*((B45^3+Ka*B45^2-(Kw+Ka*Ca)*B45-Kw*Ka)/(B45^3+(Ka+Cb)*B45^2+(Ka*Cb-Kw)*B45-Ka*Kw))
=A45+(End_pH-Start_pH)/40	=10^(-A46)	=(-Va)*((B46^3+Ka*B46^2-(Kw+Ka*Ca)*B46-Kw*Ka)/(B46^3+(Ka+Cb)*B46^2+(Ka*Cb-Kw)*B46-Ka*Kw))
=A46+(End_pH-Start_pH)/40	=10^(-A47)	=(-Va)*((B47^3+Ka*B47^2-(Kw+Ka*Ca)*B47-Kw*Ka)/(B47^3+(Ka+Cb)*B47^2+(Ka*Cb-Kw)*B47-Ka*Kw))
=A47+(End_pH-Start_pH)/40	=10^(-A48)	=(-Va)*((B48^3+Ka*B48^2-(Kw+Ka*Ca)*B48-Kw*Ka)/(B48^3+(Ka+Cb)*B48^2+(Ka*Cb-Kw)*B48-Ka*Kw))
=A48+(End_pH-Start_pH)/40	=10^(-A49)	=(-Va)*((B49^3+Ka*B49^2-(Kw+Ka*Ca)*B49-Kw*Ka)/(B49^3+(Ka+Cb)*B49^2+(Ka*Cb-Kw)*B49-Ka*Kw))
=A49+(End_pH-Start_pH)/40	=10^(-A50)	=(-Va)*((B50^3+Ka*B50^2-(Kw+Ka*Ca)*B50-Kw*Ka)/(B50^3+(Ka+Cb)*B50^2+(Ka*Cb-Kw)*B50-Ka*Kw))
=A50+(End_pH-Start_pH)/40	=10^(-A51)	=(-Va)*((B51^3+Ka*B51^2-(Kw+Ka*Ca)*B51-Kw*Ka)/(B51^3+(Ka+Cb)*B51^2+(Ka*Cb-Kw)*B51-Ka*Kw))
=A51+(End_pH-Start_pH)/40	=10^(-A52)	=(-Va)*((B52^3+Ka*B52^2-(Kw+Ka*Ca)*B52-Kw*Ka)/(B52^3+(Ka+Cb)*B52^2+(Ka*Cb-Kw)*B52-Ka*Kw))
=A52+(End_pH-Start_pH)/40	=10^(-A53)	=(-Va)*((B53^3+Ka*B53^2-(Kw+Ka*Ca)*B53-Kw*Ka)/(B53^3+(Ka+Cb)*B53^2+(Ka*Cb-Kw)*B53-Ka*Kw))
=A53+(End_pH-Start_pH)/40	=10^(-A54)	=(-Va)*((B54^3+Ka*B54^2-(Kw+Ka*Ca)*B54-Kw*Ka)/(B54^3+(Ka+Cb)*B54^2+(Ka*Cb-Kw)*B54-Ka*Kw))
=A54+(End_pH-Start_pH)/40	=10^(-A55)	=(-Va)*((B55^3+Ka*B55^2-(Kw+Ka*Ca)*B55-Kw*Ka)/(B55^3+(Ka+Cb)*B55^2+(Ka*Cb-Kw)*B55-Ka*Kw))
=A55+(End_pH-Start_pH)/40	=10^(-A56)	=(-Va)*((B56^3+Ka*B56^2-(Kw+Ka*Ca)*B56-Kw*Ka)/(B56^3+(Ka+Cb)*B56^2+(Ka*Cb-Kw)*B56-Ka*Kw))
=A56+(End_pH-Start_pH)/40	=10^(-A57)	=(-Va)*((B57^3+Ka*B57^2-(Kw+Ka*Ca)*B57-Kw*Ka)/(B57^3+(Ka+Cb)*B57^2+(Ka*Cb-Kw)*B57-Ka*Kw))
=A57+(End_pH-Start_pH)/40	=10^(-A58)	=(-Va)*((B58^3+Ka*B58^2-(Kw+Ka*Ca)*B58-Kw*Ka)/(B58^3+(Ka+Cb)*B58^2+(Ka*Cb-Kw)*B58-Ka*Kw))
=A58+(End_pH-Start_pH)/40	=10^(-A59)	=(-Va)*((B59^3+Ka*B59^2-(Kw+Ka*Ca)*B59-Kw*Ka)/(B59^3+(Ka+Cb)*B59^2+(Ka*Cb-Kw)*B59-Ka*Kw))
=A59+(End_pH-Start_pH)/40	=10^(-A60)	=(-Va)*((B60^3+Ka*B60^2-(Kw+Ka*Ca)*B60-Kw*Ka)/(B60^3+(Ka+Cb)*B60^2+(Ka*Cb-Kw)*B60-Ka*Kw))
=A60+(End_pH-Start_pH)/40	=10^(-A61)	=(-Va)*((B61^3+Ka*B61^2-(Kw+Ka*Ca)*B61-Kw*Ka)/(B61^3+(Ka+Cb)*B61^2+(Ka*Cb-Kw)*B61-Ka*Kw))
=A61+(End_pH-Start_pH)/40	=10^(-A62)	=(-Va)*((B62^3+Ka*B62^2-(Kw+Ka*Ca)*B62-Kw*Ka)/(B62^3+(Ka+Cb)*B62^2+(Ka*Cb-Kw)*B62-Ka*Kw))
=A62+(End_pH-Start_pH)/40	=10^(-A63)	=(-Va)*((B63^3+Ka*B63^2-(Kw+Ka*Ca)*B63-Kw*Ka)/(B63^3+(Ka+Cb)*B63^2+(Ka*Cb-Kw)*B63-Ka*Kw))
=A63+(End_pH-Start_pH)/40	=10^(-A64)	=(-Va)*((B64^3+Ka*B64^2-(Kw+Ka*Ca)*B64-Kw*Ka)/(B64^3+(Ka+Cb)*B64^2+(Ka*Cb-Kw)*B64-Ka*Kw))
=A64+(End_pH-Start_pH)/40	=10^(-A65)	=(-Va)*((B65^3+Ka*B65^2-(Kw+Ka*Ca)*B65-Kw*Ka)/(B65^3+(Ka+Cb)*B65^2+(Ka*Cb-Kw)*B65-Ka*Kw))
=A65+(End_pH-Start_pH)/40	=10^(-A66)	=(-Va)*((B66^3+Ka*B66^2-(Kw+Ka*Ca)*B66-Kw*Ka)/(B66^3+(Ka+Cb)*B66^2+(Ka*Cb-Kw)*B66-Ka*Kw))

Sheet1

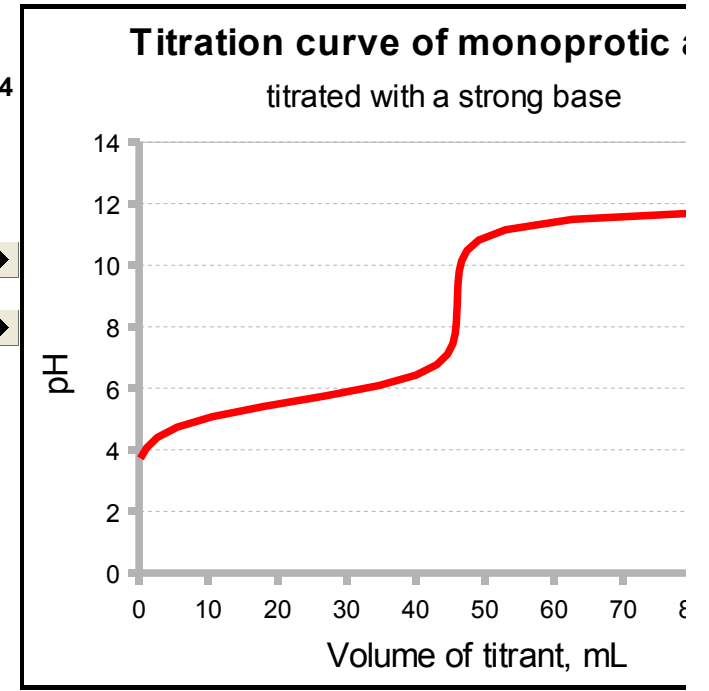
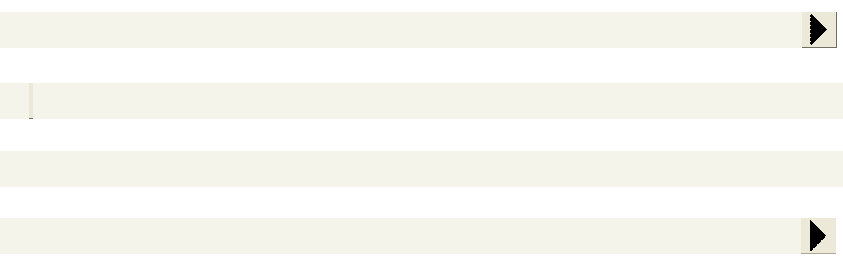
=A66+(End_pH-Start_pH)/40	=10^(-A67)	=(-Va)*((B67^3+Ka*B67^2-(Kw+Ka*Ca)*B67-Kw*Ka)/(B67^3+(Ka+Cb)*B67^2+(Ka*Cb-Kw)*B67-Ka*Kw))
=A67+(End_pH-Start_pH)/40	=10^(-A68)	=(-Va)*((B68^3+Ka*B68^2-(Kw+Ka*Ca)*B68-Kw*Ka)/(B68^3+(Ka+Cb)*B68^2+(Ka*Cb-Kw)*B68-Ka*Kw))
=A68+(End_pH-Start_pH)/40	=10^(-A69)	=(-Va)*((B69^3+Ka*B69^2-(Kw+Ka*Ca)*B69-Kw*Ka)/(B69^3+(Ka+Cb)*B69^2+(Ka*Cb-Kw)*B69-Ka*Kw))
=A69+(End_pH-Start_pH)/40	=10^(-A70)	=(-Va)*((B70^3+Ka*B70^2-(Kw+Ka*Ca)*B70-Kw*Ka)/(B70^3+(Ka+Cb)*B70^2+(Ka*Cb-Kw)*B70-Ka*Kw))
=A70+(End_pH-Start_pH)/40	=10^(-A71)	=(-Va)*((B71^3+Ka*B71^2-(Kw+Ka*Ca)*B71-Kw*Ka)/(B71^3+(Ka+Cb)*B71^2+(Ka*Cb-Kw)*B71-Ka*Kw))
=A71+(End_pH-Start_pH)/40	=10^(-A72)	=(-Va)*((B72^3+Ka*B72^2-(Kw+Ka*Ca)*B72-Kw*Ka)/(B72^3+(Ka+Cb)*B72^2+(Ka*Cb-Kw)*B72-Ka*Kw))
=A72+(End_pH-Start_pH)/40	=10^(-A73)	=(-Va)*((B73^3+Ka*B73^2-(Kw+Ka*Ca)*B73-Kw*Ka)/(B73^3+(Ka+Cb)*B73^2+(Ka*Cb-Kw)*B73-Ka*Kw))
=A73+(End_pH-Start_pH)/40	=10^(-A74)	=(-Va)*((B74^3+Ka*B74^2-(Kw+Ka*Ca)*B74-Kw*Ka)/(B74^3+(Ka+Cb)*B74^2+(Ka*Cb-Kw)*B74-Ka*Kw))
=A74+(End_pH-Start_pH)/40	=10^(-A75)	=(-Va)*((B75^3+Ka*B75^2-(Kw+Ka*Ca)*B75-Kw*Ka)/(B75^3+(Ka+Cb)*B75^2+(Ka*Cb-Kw)*B75-Ka*Kw))
=A75+(End_pH-Start_pH)/40	=10^(-A76)	=(-Va)*((B76^3+Ka*B76^2-(Kw+Ka*Ca)*B76-Kw*Ka)/(B76^3+(Ka+Cb)*B76^2+(Ka*Cb-Kw)*B76-Ka*Kw))
=A76+(End_pH-Start_pH)/40	=10^(-A77)	=(-Va)*((B77^3+Ka*B77^2-(Kw+Ka*Ca)*B77-Kw*Ka)/(B77^3+(Ka+Cb)*B77^2+(Ka*Cb-Kw)*B77-Ka*Kw))
=A77+(End_pH-Start_pH)/40	=10^(-A78)	=(-Va)*((B78^3+Ka*B78^2-(Kw+Ka*Ca)*B78-Kw*Ka)/(B78^3+(Ka+Cb)*B78^2+(Ka*Cb-Kw)*B78-Ka*Kw))
=A78+(End_pH-Start_pH)/40	=10^(-A79)	=(-Va)*((B79^3+Ka*B79^2-(Kw+Ka*Ca)*B79-Kw*Ka)/(B79^3+(Ka+Cb)*B79^2+(Ka*Cb-Kw)*B79-Ka*Kw))
=A79+(End_pH-Start_pH)/40	=10^(-A80)	=(-Va)*((B80^3+Ka*B80^2-(Kw+Ka*Ca)*B80-Kw*Ka)/(B80^3+(Ka+Cb)*B80^2+(Ka*Cb-Kw)*B80-Ka*Kw))
=A80+(End_pH-Start_pH)/40	=10^(-A81)	=(-Va)*((B81^3+Ka*B81^2-(Kw+Ka*Ca)*B81-Kw*Ka)/(B81^3+(Ka+Cb)*B81^2+(Ka*Cb-Kw)*B81-Ka*Kw))
=A81+(End_pH-Start_pH)/40	=10^(-A82)	=(-Va)*((B82^3+Ka*B82^2-(Kw+Ka*Ca)*B82-Kw*Ka)/(B82^3+(Ka+Cb)*B82^2+(Ka*Cb-Kw)*B82-Ka*Kw))
=A82+(End_pH-Start_pH)/40	=10^(-A83)	=(-Va)*((B83^3+Ka*B83^2-(Kw+Ka*Ca)*B83-Kw*Ka)/(B83^3+(Ka+Cb)*B83^2+(Ka*Cb-Kw)*B83-Ka*Kw))
=A83+(End_pH-Start_pH)/40	=10^(-A84)	=(-Va)*((B84^3+Ka*B84^2-(Kw+Ka*Ca)*B84-Kw*Ka)/(B84^3+(Ka+Cb)*B84^2+(Ka*Cb-Kw)*B84-Ka*Kw))
=A84+(End_pH-Start_pH)/40	=10^(-A85)	=(-Va)*((B85^3+Ka*B85^2-(Kw+Ka*Ca)*B85-Kw*Ka)/(B85^3+(Ka+Cb)*B85^2+(Ka*Cb-Kw)*B85-Ka*Kw))
=A85+(End_pH-Start_pH)/40	=10^(-A86)	=(-Va)*((B86^3+Ka*B86^2-(Kw+Ka*Ca)*B86-Kw*Ka)/(B86^3+(Ka+Cb)*B86^2+(Ka*Cb-Kw)*B86-Ka*Kw))

Ka

$$=10^{((-D3)/10)}$$

Kw

1.00E-14

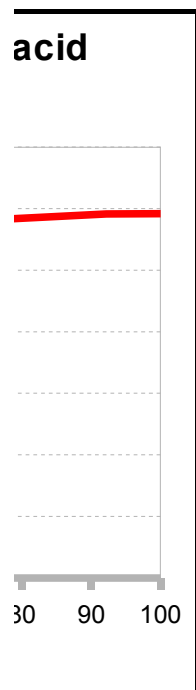


Plotted data

pH	=C41	1st Derivative
=IF (A42<Start_pH;"";A42)	=IF (C42<0;"";C42)	=(D44-D42)/(C44-C42)
=IF (A43<Start_pH;"";A43)	=IF (C43<0;"";C43)	=(D45-D43)/(C45-C43)
=IF (A44<Start_pH;"";A44)	=IF (C44<0;"";C44)	=(D46-D44)/(C46-C44)
=IF (A45<Start_pH;"";A45)	=IF (C45<0;"";C45)	=(D47-D45)/(C47-C45)
=IF (A46<Start_pH;"";A46)	=IF (C46<0;"";C46)	=(D48-D46)/(C48-C46)
=IF (A47<Start_pH;"";A47)	=IF (C47<0;"";C47)	=(D49-D47)/(C49-C47)
=IF (A48<Start_pH;"";A48)	=IF (C48<0;"";C48)	=(D50-D48)/(C50-C48)
=IF (A49<Start_pH;"";A49)	=IF (C49<0;"";C49)	=(D51-D49)/(C51-C49)
=IF (A50<Start_pH;"";A50)	=IF (C50<0;"";C50)	=(D52-D50)/(C52-C50)
=IF (A51<Start_pH;"";A51)	=IF (C51<0;"";C51)	=(D53-D51)/(C53-C51)
=IF (A52<Start_pH;"";A52)	=IF (C52<0;"";C52)	=(D54-D52)/(C54-C52)
=IF (A53<Start_pH;"";A53)	=IF (C53<0;"";C53)	=(D55-D53)/(C55-C53)
=IF (A54<Start_pH;"";A54)	=IF (C54<0;"";C54)	=(D56-D54)/(C56-C54)
=IF (A55<Start_pH;"";A55)	=IF (C55<0;"";C55)	=(D57-D55)/(C57-C55)
=IF (A56<Start_pH;"";A56)	=IF (C56<0;"";C56)	=(D58-D56)/(C58-C56)
=IF (A57<Start_pH;"";A57)	=IF (C57<0;"";C57)	=(D59-D57)/(C59-C57)
=IF (A58<Start_pH;"";A58)	=IF (C58<0;"";C58)	=(D60-D58)/(C60-C58)
=IF (A59<Start_pH;"";A59)	=IF (C59<0;"";C59)	=(D61-D59)/(C61-C59)
=IF (A60<Start_pH;"";A60)	=IF (C60<0;"";C60)	=(D62-D60)/(C62-C60)
=IF (A61<Start_pH;"";A61)	=IF (C61<0;"";C61)	=(D63-D61)/(C63-C61)
=IF (A62<Start_pH;"";A62)	=IF (C62<0;"";C62)	=(D64-D62)/(C64-C62)
=IF (A63<Start_pH;"";A63)	=IF (C63<0;"";C63)	=(D65-D63)/(C65-C63)
=IF (A64<Start_pH;"";A64)	=IF (C64<0;"";C64)	=(D66-D64)/(C66-C64)
=IF (A65<Start_pH;"";A65)	=IF (C65<0;"";C65)	=(D67-D65)/(C67-C65)
=IF (A66<Start_pH;"";A66)	=IF (C66<0;"";C66)	=(D67-D65)/(C67-C65)

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=IF (A67<Start_pH;"";A67)	=IF (C67<0;"";C67)	=(D68-D66)/(C68-C66)
=IF (A68<Start_pH;"";A68)	=IF (C68<0;"";C68)	=(D69-D67)/(C69-C67)
=IF (A69<Start_pH;"";A69)	=IF (C69<0;"";C69)	=(D70-D68)/(C70-C68)
=IF (A70<Start_pH;"";A70)	=IF (C70<0;"";C70)	=(D71-D69)/(C71-C69)
=IF (A71<Start_pH;"";A71)	=IF (C71<0;"";C71)	=(D72-D70)/(C72-C70)
=IF (A72<Start_pH;"";A72)	=IF (C72<0;"";C72)	=(D73-D71)/(C73-C71)
=IF (A73<Start_pH;"";A73)	=IF (C73<0;"";C73)	=(D74-D72)/(C74-C72)
=IF (A74<Start_pH;"";A74)	=IF (C74<0;"";C74)	=(D75-D73)/(C75-C73)
=IF (A75<Start_pH;"";A75)	=IF (C75<0;"";C75)	=(D76-D74)/(C76-C74)
=IF (A76<Start_pH;"";A76)	=IF (C76<0;"";C76)	=(D77-D75)/(C77-C75)
=IF (A77<Start_pH;"";A77)	=IF (C77<0;"";C77)	=(D78-D76)/(C78-C76)
=IF (A78<Start_pH;"";A78)	=IF (C78<0;"";C78)	=(D79-D77)/(C79-C77)
=IF (A79<Start_pH;"";A79)	=IF (C79<0;"";C79)	=(D80-D78)/(C80-C78)
=IF (A80<Start_pH;"";A80)	=IF (C80<0;"";C80)	=(D81-D79)/(C81-C79)
=IF (A81<Start_pH;"";A81)	=IF (C81<0;"";C81)	=(D82-D80)/(C82-C80)
=IF (A82<Start_pH;"";A82)	=IF (C82<0;"";C82)	=(D83-D81)/(C83-C81)
=IF (A83<Start_pH;"";A83)	=IF (C83<0;"";C83)	=(D84-D82)/(C84-C82)
=IF (A84<Start_pH;"";A84)	=IF (C84<0;"";C84)	=(D85-D83)/(C85-C83)
=IF (A85<Start_pH;"";A85)	=IF (C85<0;"";C85)	=(D86-D84)/(C86-C84)
=IF (A86<Start_pH;"";A86)	=IF (C86<0;"";C86)	=(D87-D85)/(C87-C85)



Sheet1



Sheet1